3. Discussion of Results

The summary of composite data and the detailed appendix tables permit analysis of equipment and operating costs for each region, depth, method, and type of production. The data in this report should be considered as revised, except for the 1999 data, which are preliminary. Some of the revisions which appear in this report affected equipment costs for the entire series, beginning in 1976. Though these were small, in most cases, the equipment cost revisions reflected a minor change in operating costs. There were no major revisions. The following is a discussion of the composite costs and indices.

Overview

This report continues a data series begun in 1976, providing a history of equipment and operating costs for oil and gas leases from 1976 through 1999. (See Appendix N for both nominal and deflated full-series data). Figure 3 shows indices of the aggregate average costs for oil well equipment and operations, indicating general upward pressure on costs. The period of rapid cost increase which began before 1976 changed in 1982, the peak year for total equipment costs, which was followed by prices rising and falling within a range somewhat near the 1982 level. Operating costs followed a different path. The post-1982 drop was minimal, and the 1982 level has been exceeded each year since 1989. Operating costs for 1999 are at the all-time peak. These have been largely influenced by energy costs (natural gas and electric power) and the costs of oil field services such as well servicing units and chemicals. Labor has also been a factor in many areas.

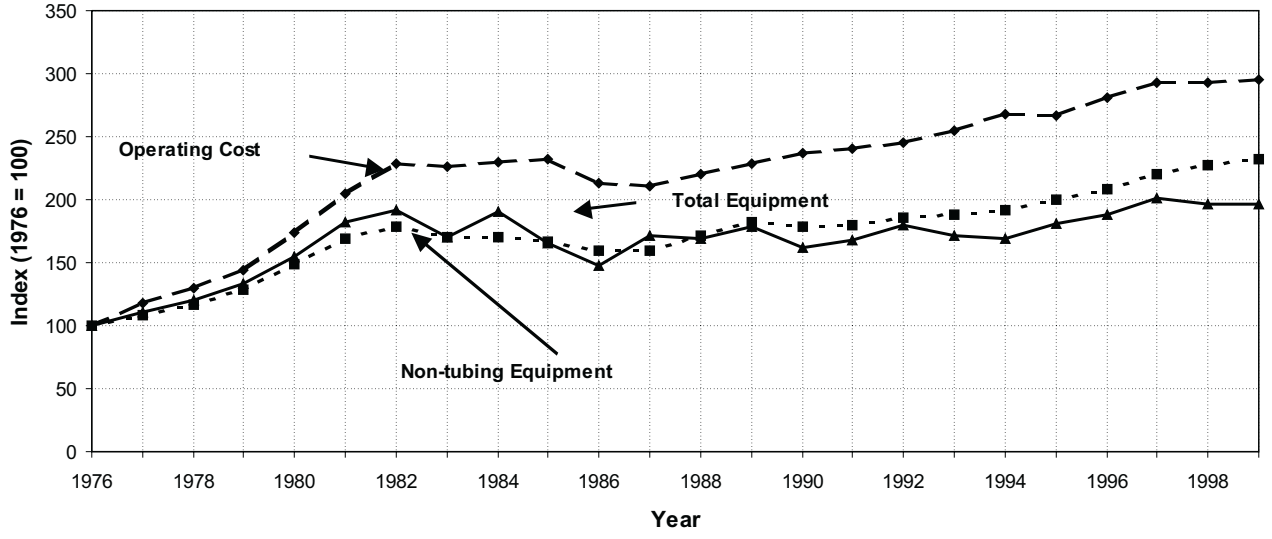
Figure 4 is a plot of tubing costs for 10-well oil leases. The type of tubing used for deeper wells not only costs more than that used for shallower wells, but price variations have been more extreme. Prices for 12,000-foot wells have fluctuated in a narrow range since 1994 and both 1998 and 1999 showed price drops. Costs for shallower wells have generally followed the same trend.

Figure 5 is a plot of oil lease equipment costs excluding tubing. Contrasting Figures 4 and 5, the non-tubing equipment costs vary much less than those for tubing. However, the 1982 non-tubing equipment costs were nearly double the 1976 costs. Non-tubing equipment costs declined from 1982 through 1987 and have generally increased since.

The 1999 index of non-tubing equipment cost for all depths is about 232, which is 132 percent higher than the 1976 cost. Since 1976, the non-tubing cost for 8,000-foot wells was exceeded by that for 12,000-foot wells about one-third of the time, an anomaly related to the mixture of pumping equipment types used for 8,000-foot wells.

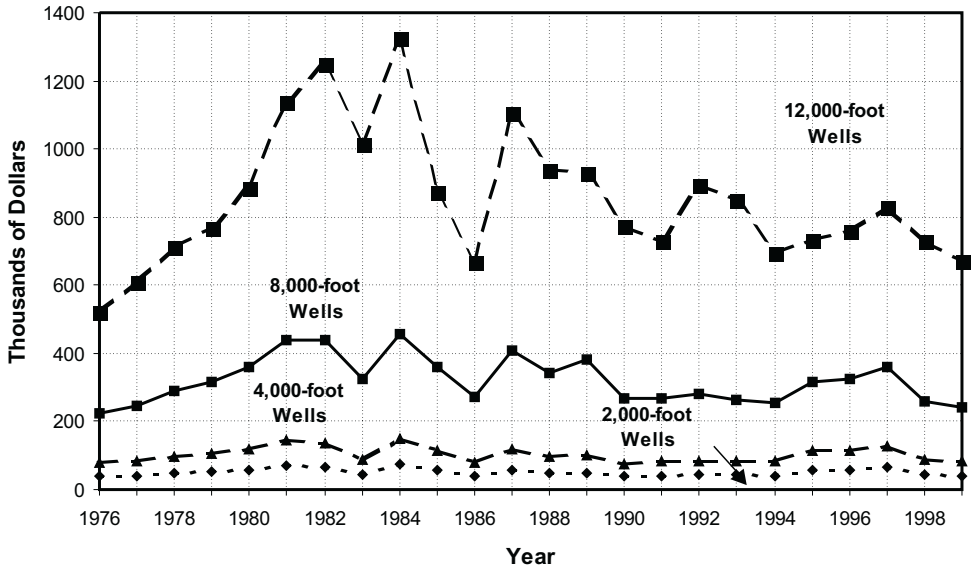
The availability of well service units (WSUs) is widely used as an indicator of price pressures on operating costs. When

Figure 3. Aggregate Average Cost Indices for Primary Oil Recovery, 1976-1999 (Operation and Equipment, With and Without Tubing Costs)



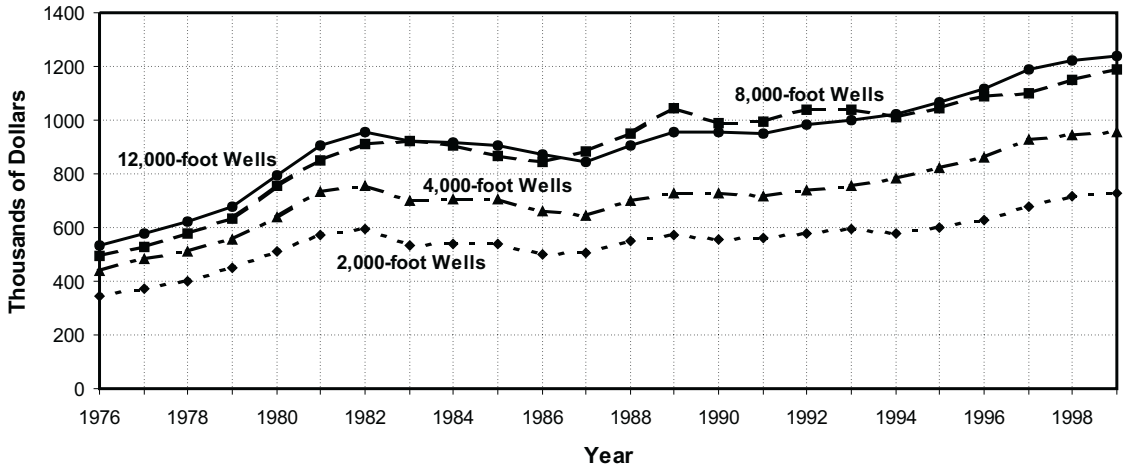
Source: Energy Information Administration, Office of Oil and Gas

Figure 4. Tubing Costs for Oil Leases, 1976-1999 (10 Producing Wells)



Source: Energy Information Administration, Office of Oil and Gas.

Figure 5. Non-tubing Equipment Costs for Oil Leases, 1976-1999 (10 Producing Wells)



Source: Energy Information Administration, Office of Oil and Gas.

WSU utilization is high, prices of other operating cost items are usually firm. The active WSU count rose from about 2,600 in 1976 to 4,850 in 1981, when activity levels peaked (see Figure 6). Although the 1992 active WSU count dropped to near 1976 levels, later counts show a modest increase, except for 1998 and 1999, when it dropped. At the same time, available WSUs dropped to 1980 levels. Pressure on the well service industry was the result of overbuilding in the early 1980's. With a peak of about 8,000 WSU's available in 1985, the portion of WSUs at work was less than 60 percent. In 1986, working WSUs were only 40 percent of those available, and 1999 surveys reflect that 59 percent of the WSUs were working. Industry reports show that there are labor constraints that limit the current level of active WSUs in some areas, thus indicating a need for industry-wide price increases to cover not only labor, but repair and replacement of equipment.

Figure 7 contains the equipping and operating cost indices for gas wells (note that gas well equipment costs do not include tubing costs). The index for gas equipment costs increased steadily from 1976 to a peak of about 183 in 1982. Lower levels of activity forced the index to a low of 153 in 1986, from which time costs increased to set new highs between 1990 and 1993, with a slight drop to 1994. The trend from 1994 to 1999 has been upward, although prices were flat from 1998 to 1999. Operating costs have set new highs beginning with 1990, and rose at a steadier pace than equipment costs because of recent changes in labor prices, which are a major influence on the overall costs of gas well operation. The use of gas for fuel on gas leases is relatively insignificant, so increasing gas prices had little effect.

Equipment Costs for Oil Leases

Primary Recovery

Table 1 is a summary of the composite lease equipment costs and indices for primary oil recovery operations in 6 onshore producing regions by depth. The trends in costs varied by depth and region. The aggregate (or sum) of the 10-well oil lease equipment costs for the six regions and 4 depths increased 4.4percent in the period from 1996 to 1999. Table 1 also presents the average costs and indices of the 6 regions by depth. As shown in Figure 8, the average equipment costs increase with depth.

The annual increases are greater for deeper wells, as might be expected. Although there are regional differences in equipment costs for each depth of wells, the range of indexed values is larger for operating costs. The significant fact is that costs for primary oil equipment and operations rose 4.4percent and 5.1 percent, respectively, from 1996 to 1999.

Secondary Recovery

Table 2 summarizes the additional lease equipment costs and indices associated with secondary oil recovery (waterflood) from depths of 2,000, 4,000, and 8,000 feet in west Texas. This region was the focus of a substantial part of the early secondary recovery work in the country, and the differences between primary and secondary costs are presumed to be similar to those in other regions. The method used in this report is waterflooding. The additional lease equipment is the equipment needed to convert from a primary recovery operation to a secondary recovery operation. The aggregate increase in additional equipment costs was about 12 percent for the 1996-1999 period. As noted before, drilling cost estimates are subject to major annual revisions and, as drilling costs can account for more than one-half of the additional equipment costs, revisions to drilling costs may obscure the changes in other costs. 1997 drilling costs reflect the end of over-capacity in the industry, and limitations of equipment, personnel and auxiliary services add to constrain activity in some areas. Low oil prices helped push drilling costs lower in 1998 and 1999. Figure 9 shows the additional costs of waterflood equipment for depths of 2,000, 4,000, and 8,000 feet for 1996 through 1999.

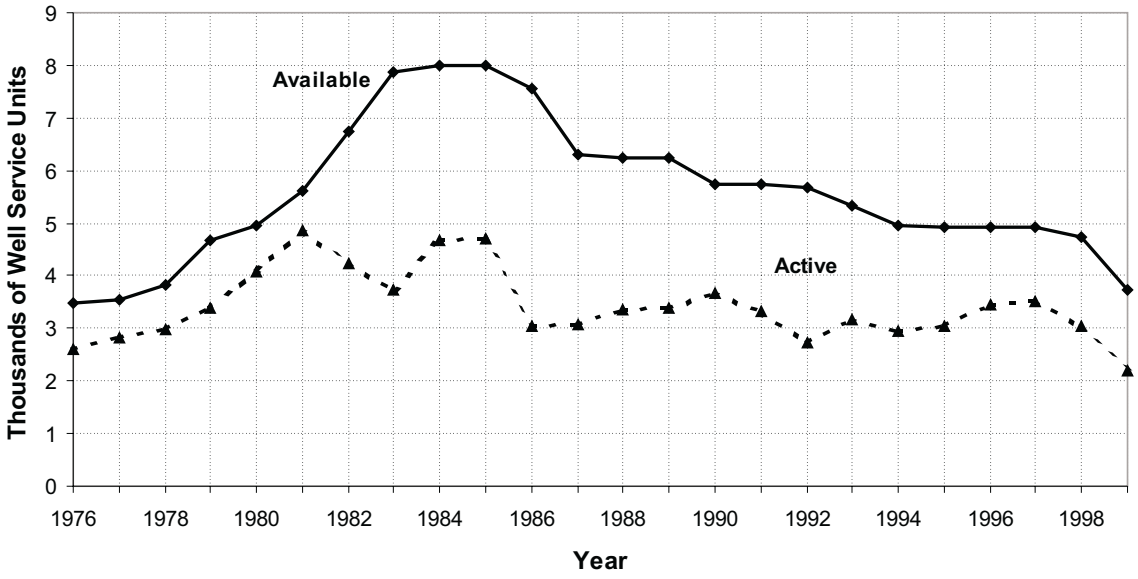
Operating Costs for Oil Leases

Primary Recovery

Table 3 is a summary of the annual operating costs and indices for primary oil recovery operations which are shown in Figure 10 while those for secondary operations are shown in Figure 11. The average for the aggregate of the operating costs for the 6 regions and 4 depths was $229,700 for the 10-well lease in 1999. This represents about a 5.1 percent increase over 1996. Examination of Table 3 shows that most costs for oil operations rose from 1996 to 1999. The 1976 to 1997 history of aggregate operating costs is shown in Figure 3. The upward trend in operating costs began in 1988.

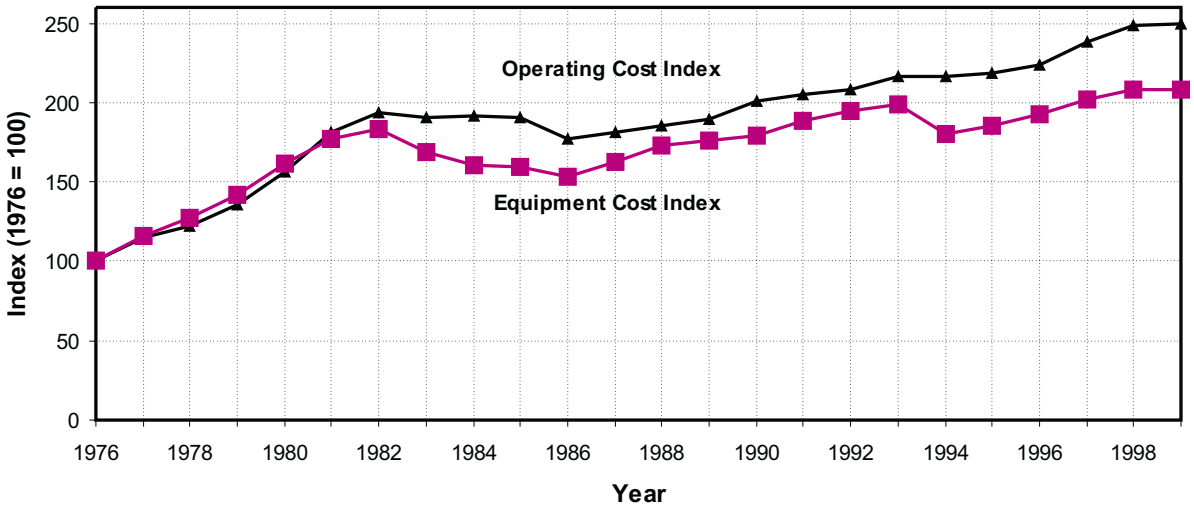
Changes in individual components of operating costs show large variations. Fuel, power and water costs comprise one of the most volatile components for oil leases, primarily due to changes in the average price of natural gas in the different regions. Overall costs for fuel, power and water ranged from drops of about 4 percent for the 1996-1999 period for California, from 6 to 17 percent for the Rocky Mountains, and from 20 to 25 percent in the other regions. Contrasted with the rest of the nation, the primary energy source for California and the Rocky Mountains regions is electricity. In the Rocky Mountains, electricity is generated by coal-fired plants and hydroelectric plants that have adequate water supplies. In California, hydroelectric plants operate at full generating capacity as long as there is an ample water supply. However, their water supply is weather-dependent with little or no reserve, so a dry winter can cause reduction in hydroelectric generation of electricity the following year.

Figure 6. Active Well Service Units, 1976-1999



Source: Energy Information Administration, Office of Oil and Gas.

Figure 7. Aggregate Average Cost Indices for Gas Recovery, 1976-1999 (Operation and Non-tubing Equipment Costs)



Source: Energy Information Administration, Office of Oil and Gas.

Table 1. Summary of Lease Equipment Costs and Composite Indices for Primary Oil Recovery Operations (10 Producing Wells)

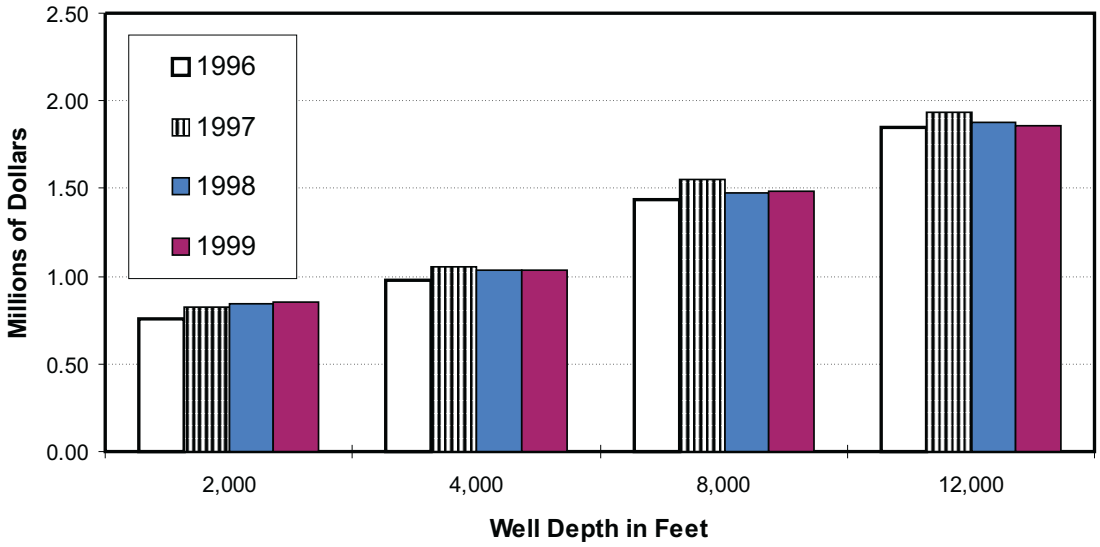
Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
California	187.8	203.2	201.7	208.5	1,046,700
Oklahoma	210.5	230.2	237.2	240.5	841,100
South Louisiana	205.5	225.3	230.4	231.6	857,300
South Texas	201.2	218.5	224.1	225.8	802,600
West Texas	196.5	214.1	221.7	223.6	789,200
Rocky Mountains	193.8	216.8	224.3	225.5	794,500
Average or Index	**198.5**	**217.1**	**221.9**	**224.8**	**855,200**
			4,000-Foot Wells		
California	167.0	180.2	175.6	180.0	1,264,500
Oklahoma	202.3	210.5	207.9	209.5	1,054,700
South Louisiana	218.0	245.8	241.0	237.3	1,010,700
South Texas	202.8	223.6	218.8	215.9	940,500
West Texas	186.0	192.4	190.3	190.6	969,000
Rocky Mountains	180.8	197.2	194.1	194.5	987,500
Average or Index	**190.3**	**205.2**	**201.5**	**201.9**	**1,037,800**
			8,000-Foot Wells		
California	173.5	182.6	172.1	177.5	1,620,500
Oklahoma	217.9	227.5	217.3	218.2	1,599,200
South Louisiana	218.0	246.6	237.0	232.6	1,281,900
South Texas	198.5	220.1	210.6	207.0	1,169,200
West Texas	182.8	191.4	184.6	186.2	1,651,700
Rocky Mountains	167.8	184.8	175.7	175.3	1,573,800
Average or Index	**189.8**	**204.4**	**195.2**	**195.7**	**1,482,700**
			12,000-Foot Wells		
California	172.9	181.4	175.1	175.5	1,976,300
Oklahoma	191.6	200.5	196.2	194.2	1,886,300
South Louisiana	186.0	196.2	190.9	187.9	1,939,300
South Texas	184.1	190.8	185.5	182.9	1,856,600
West Texas	174.4	181.3	178.5	176.5	1,754,300
Rocky Mountains	177.4	187.1	180.4	177.3	1,742,800
Average or Index	**180.9**	**189.4**	**184.2**	**182.2**	**1,859,300**
Aggregate Average	**187.7**	**200.6**	**196.0**	**195.9**	**1,308,800**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

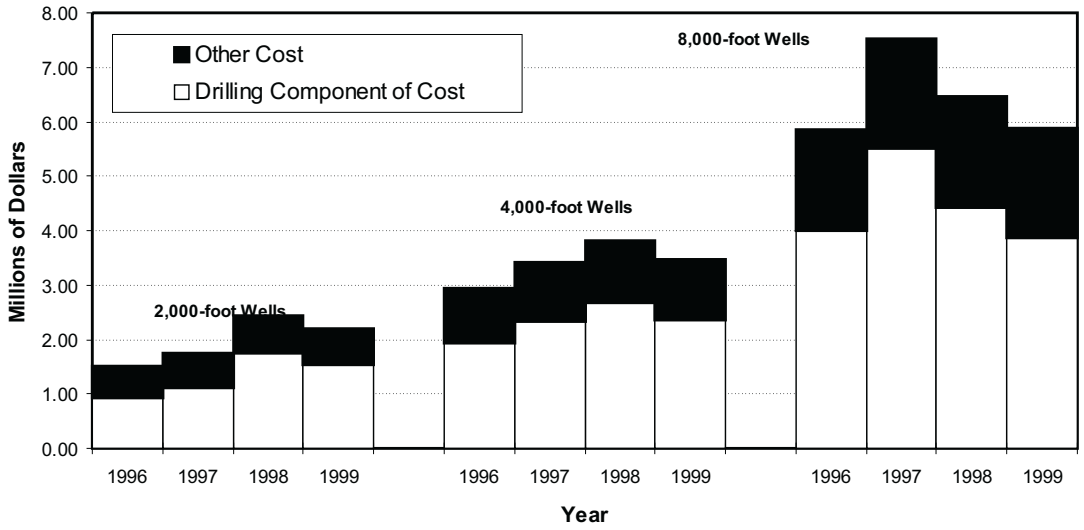
Source: Energy Information Administration, Office of Oil and Gas

Figure 8. Aggregate Average Lease Equipment Costs for Primary Oil Recovery, 1996-1999 (10 Producing Wells)



Source: Energy Information Administration, Office of Oil and Gas.

Figure 9. Additional Cost of Lease Equipment for Secondary Recovery in West Texas, 1996-1999 (10 Producing and 11 Injection Wells)



Source: Energy Information Administration, Office of Oil and Gas.

Table 2. Summary of Additional Costs and Composite Indices for Lease Equipment and Injection Wells in West Texas for Secondary Oil Recovery

Component	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
Injection Equipment	238.8	249.8	286.3	279.0	547,300
Producing Equipment	158.2	192.2	172.0	170.9	138,100
Injection Wells**	173.5	208.0	328.1	287.8	1,524,700
Total or Index	187.9	216.7	302.4	274.0	2,210,100
			4,000-Foot Wells		
Injection Equipment	226.8	237.3	271.7	264.7	546,800
Producing Equipment	162.2	180.9	170.4	169.5	559,100
Injection Wells**	169.5	205.6	236.2	207.2	2,351,600
Total or Index	**175.2**	**204.6**	**227.6**	**206.8**	**3,457,500**
			8,000-Foot Wells		
Injection Equipment	231.9	243.6	284.2	275.3	934,200
Producing Equipment	156.6	172.4	157.2	155.5	1,068,800
Injection Wells**	134.3	184.9	148.2	130.0	3,874,600
Total or Index	**146.4**	**187.8**	**161.3**	**146.7**	**5,877,600**
Aggregate Average	**159.0**	**195.7**	**195.9**	**178.0**	**3,848,400**

* Preliminary

**Costs from Joint Association Survey data.

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

The reduction in hydroelectric capacity is made up by power from generators using alternate fuels, or is purchased from out-of-state sources. Therefore, electric rates can vary widely in California. Figure 12 depicts fuel, power, and water indices for 12,000-foot wells in the Rocky Mountains and California.

Secondary Recovery

Table 4 provides a summary of the composite secondary oil recovery operating costs for west Texas. The average aggregated lease costs (10 producing and 11 injection wells) for all depths rose about 9 percent from 1996 to 1999. The components present two different trends: the normal daily costs and surface repair costs rose from 1996 to 1999 while subsurface repair costs rose in 1997 and 1998, then dropped in 1999. The decrease was caused by lower WSU costs and lower equipment repair costs. Fuel, power, and water costs for secondary recovery operations decreased by about 1 percent for the 1996-1999 period and costs for primary recovery operations in this region decreased about 23 percent for the same period. The differences in the changes for fuel, power, and water costs occurred because engines powered by natural gas engines were the prime movers for primary recovery operations in this region, and electric motors were used for secondary recovery operations. As an example, Figure 13 shows fuel, power, and water cost indices for primary and secondary oil recovery in west Texas for 4,000-foot wells. Only 7 years of the 1976 to 1999 period indicated indices in excess of those for primary oil operation. And, although 1999 was one of those years, it was also a time when the two index trends almost converged.

Offshore Operations

Table 5 presents a summary of annual operating costs and composite indices for offshore production operations in the Gulf of Mexico for wells with a true vertical depth of 10,500 feet. Production from offshore installations includes large gas volumes compared to the average onshore lease, and this is reflected in operating costs. The aggregate average of costs at all water depths increased by about 23 percent from 1996 to $4,658,900 per platform in 1999.

Equipment Costs for Gas Leases

Equipment and operating costs for gas leases producing from depths of 2,000, 4,000, 8,000, 12,000, and 16,000 feet, were

determined for 6 onshore regions of the lower 48 States (Figure 2). For each region and depth, costs and indices for equipment for a one-well lease were determined for representative or average gas production rates. Costs and indices were also calculated for a higher and, where possible, for a lower production rate. Composite indices and costs for equipment are presented for a one-well lease with production rates of 50, 250, 500, 1,000, 5,000, and 10,000 Mcf of gas per day by depth and region. Figure 14 displays the average equipment costs by rate of production and well depth for 1997. There is a large difference between the equipment costs for some production rates and depths, such as wells of various depths producing 250 Mcf per day. This difference is the result of variations in the type and size of equipment needed in different regions, for different depths, and for different production rates. For example, dehydrators and line heaters are needed in cold climates but may not be needed in more temperate climates.

The indices for the aggregate costs of gas lease equipment for all depths and regions rose 8.2 percent for the 1996-1999 period. Table 6 shows that the overall aggregate average gas lease has an equipment cost of $48,700 in 1999.

Tables 7 through 12 present summaries of composite gas lease equipment costs and indices for a given production rate by depth and region. For each production rate, the costs are summed and averaged for the selected regions and depths. These average costs and the corresponding indices are presented in each table. The 1996-1999 change in equipment costs ranged from an increase of 4 percent for wells producing 10,000 Mcf of gas per day to an increase of about 11 percent for wells flowing 5 MMcf of gas per day.

Table 13 contains gas lease equipment costs aggregated by depth. Changes in gas equipment costs from 1996 to 1999 were positive for all wells, and ranged from increases of 6.1 to 9.3 percent. The dominant factor in determining gas well equipment costs is the production capacity of the equipment. Figure 15 illustrates the aggregate average gas well equipment costs for 1996 through 1999 by production rate. The stair-step appearance of the costs for each production rate shows greater year-to-year variation for higher flow rates.

Operating Costs for Gas Leases

Operating costs for gas leases aggregated for all depths, regions and production rates are shown in Table 14. There was an increase of 11.8 percent from 1996 to 1999, to $26,500. Tables 15 through 20 are summaries of composite costs and indices for operating a gas lease. Each table is a summary for one production rate for the same depth and region used for lease equipment costs. For each depth and production rate, the individual operating costs by region were averaged and indices were calculated. From 1996 to 1999, wells producing 10,000 Mcf per day exhibited an operating cost increase of about 5.7 percent, while costs for wells producing at a rate of 250 Mcf per day rose at about 13.6 percent.

Figure 16 shows the gas well operating cost by producing rate for the years from 1996 to 1999. From this depiction, the annual increase in operating cost from 1996 to 1997 stands out from the remaining periods.

Well depth has more effect on gas well operating costs than on equipment costs, since depth is a major factor in the cost of down-hole repairs, the amount of chemicals used, and other maintenance cost components. However, the changes in operating costs aggregated by depth from 1996 through 1999 show moderate variation across time. The cost changes ranged from 9.8 to 14.5 percent from 1996 to 1999. The annual gas well operating costs aggregated by depth are shown in Table 21.

Figure 17 depicts the aggregate average annual gas well operating costs by depth and producing rate for 1997. Operating costs decreased as the producing rate increased from 250 to 500 thousand cubic feet of gas per day in 8,000- and 12,000-foot wells. This is a result of the well design and the completion techniques used. Wells producing at 500 thousand cubic feet of gas per day, or more, were considered to be completed with packers. Packers protect the casing-tubing annulus and the casing wellhead from the bottom-hole pressure and any corrosive properties of the well's fluids. With these flow rates, the tubing flow velocity is sufficient to remove the well liquids which accumulate in the tubing. Either tubing displacement or corrosion inhibitor squeeze jobs can be used to protect the production string from corrosion or scale deposition. Wells producing at rates of 250 thousand cubic feet of gas per day or less have lower tubing flow velocities which are not always adequate to remove accumulated liquids from the well. Increasing liquid levels usually cause reduced gas production. Therefore, these wells were considered to be completed without packers to permit fluids to be forced up the tubing by expansion of the compressed gas in the casing-tubing annulus. Because the gas wells which produce at lower flow rates have no packers, the casing-tubing annulus is exposed to the corrosive properties of the well fluids and often needs chemical protection. Tubing displacement and corrosion inhibitor squeeze jobs are not effective without a packer, or making them effective would be cost prohibitive. Therefore, continuous chemical injection down the casing-tubing annulus is a common practice. This involves surface chemical injection pumps, maintenance, and larger volumes of chemicals. Therefore, wells which produce less than 250 thousand cubic feet of gas per day have higher fuel, chemical and disposal costs, and higher surface maintenance costs.

Table 3. Summary of Direct Annual Operating Costs and Composite Indices for Primary Oil Recovery Operations (10 Producing Wells)

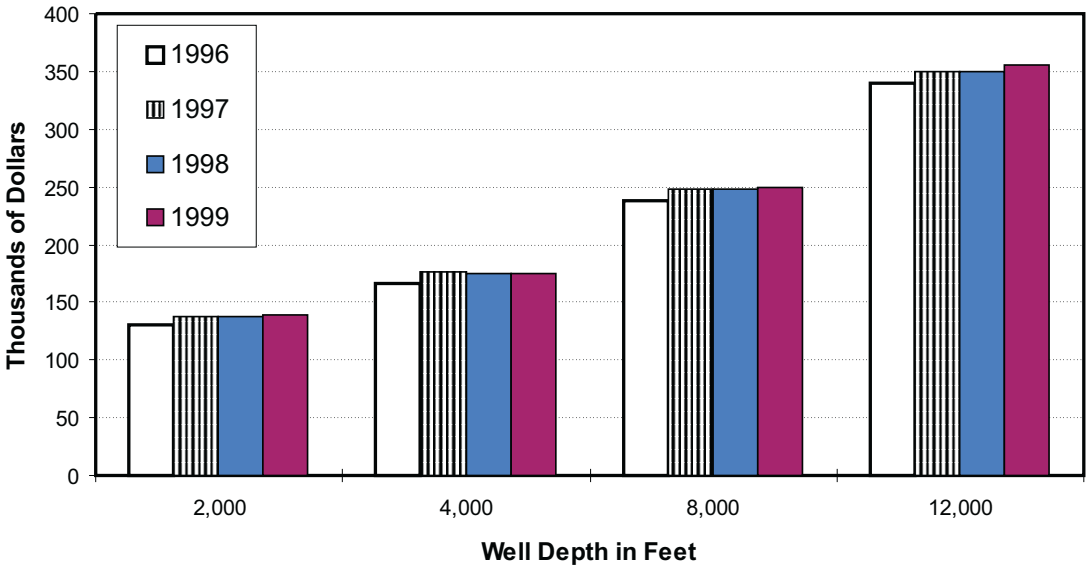
Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
California	267.1	278.4	281.2	282.3	154,400
Oklahoma	261.6	279.8	273.5	273.7	121,800
South Louisiana	260.3	284.6	279.4	280.1	152,400
South Texas	254.3	262.5	255.7	258.1	141,700
West Texas	243.2	253.1	258.1	261.6	119,300
Rocky Mountains	228.2	241.8	254.8	255.5	142,300
Average or Index	**252.5**	**266.7**	**267.2**	**268.8**	**138,700**
			4,000-Foot Wells		
California	284.5	291.9	294.6	295.9	204,200
Oklahoma	264.6	283.4	275.2	275.6	141,100
South Louisiana	260.1	286.6	278.8	275.6	215,500
South Texas	240.9	250.1	244.1	244.0	192,000
West Texas	244.2	254.7	257.2	259.2	137,400
Rocky Mountains	224.6	238.1	249.1	250.2	160,400
Average or Index	**253.3**	**267.6**	**266.5**	**266.5**	**175,100**
			8,000-Foot Wells		
California	369.7	370.2	374.0	377.4	349,500
Oklahoma	320.3	333.2	331.7	335.6	253,400
South Louisiana	267.2	294.6	286.6	284.2	258,300
South Texas	250.3	260.8	252.0	251.3	233,200
West Texas	243.4	255.1	253.5	252.9	186,900
Rocky Mountains	211.4	222.5	234.8	245.0	216,600
Average or Index	**277.4**	**289.6**	**289.0**	**291.4**	**249,700**
			12,000-Foot Wells		
California	384.6	382.0	387.3	392.0	510,800
Oklahoma	324.0	338.2	334.6	337.7	302,200
South Louisiana	293.2	309.9	306.9	311.3	357,400
South Texas	291.4	300.3	296.3	299.9	358,100
West Texas	290.8	300.3	300.3	305.2	288,100
Rocky Mountains	285.3	294.8	307.5	313.1	315,000
Average or Index	**313.8**	**322.7**	**323.9**	**328.4**	**355,300**
Aggregate Average	**280.8**	**292.7**	**292.8**	**295.2**	**229,700**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

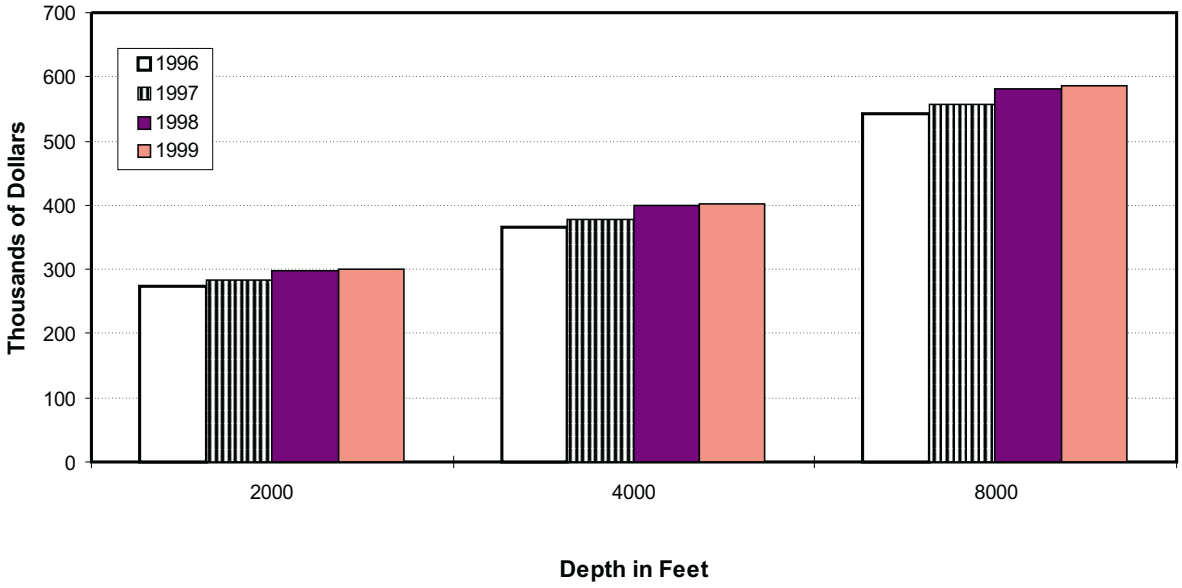
Source: Energy Information Administration, Office of Oil and Gas

Figure 10. Aggregate Operating Costs for Primary Oil Recovery Operations, 1996-1999



Source: Energy Information Administration, Office of Oil and Gas.

Figure 11. Annual Operating Costs for Secondary Oil Recovery in West Texas, 1996-1999 (10 Producing and 11 Injection Wells)



Source: Energy Information Administration, Office of Oil and Gas.

Table 4. Summary of Direct Annual Operating Costs and Composite Indices for Secondary Oil Recovery Operations in West Texas

Component	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
Normal Daily	272.0	283.6	296.1	299.2	184,600
Surface Repair	234.1	236.9	260.8	269.6	58,500
Subsurface Repair	198.2	205.1	214.0	206.6	56,200
Total or Index	**246.4**	**255.2**	**269.0**	**270.6**	**299,300**
			4,000-Foot Wells		
Normal Daily	269.6	279.4	293.1	297.2	224,700
Surface Repair	239.1	243.1	268.2	277.3	95,100
Subsurface Repair	194.1	201.2	209.3	202.5	82,600
Total or Index	**242.2**	**250.0**	**264.8**	**267.0**	**402,400**
			8,000-Foot Wells		
Normal Daily	283.9	292.2	301.4	305.4	320,700
Surface Repair	241.6	244.2	268.9	278.4	105,800
Subsurface Repair	202.7	209.2	216.8	210.7	158,900
Total or Index	**248.5**	**255.2**	**266.6**	**268.0**	**585,400**
Aggregate Average	**246.0**	**253.5**	**266.5**	**268.3**	**429,000**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 5. Summary of Direct Annual Operating Costs and Composite Indices per Platform--Gulf of Mexico (10,500-Foot True Vertical Depth Wells)

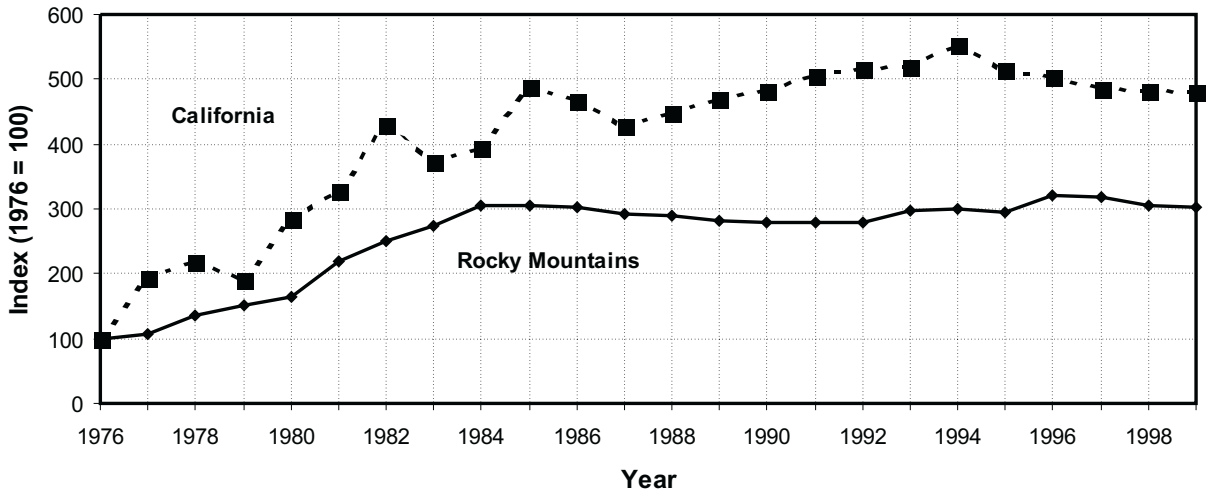
Water Depth	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			12-Slot Platforms		
100 Foot	262.0	331.5	337.0	323.7	3,979,300
300 Foot	255.8	322.2	328.3	314.5	4,131,000
Average or Index	**258.8**	**326.7**	**332.5**	**319.0**	**4,055,200**
			18-Slot Platforms		
100 Foot	253.2	321.0	328.7	313.6	4,849,100
300 Foot	250.6	317.0	325.4	309.6	5,030,320
600 Foot	236.5	293.9	300.1	287.5	5,305,000
Average or Index	**246.2**	**309.8**	**317.1**	**302.7**	**5,061,500**
Aggregate Average	**250.4**	**315.5**	**322.3**	**308.2**	**4,658,900**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

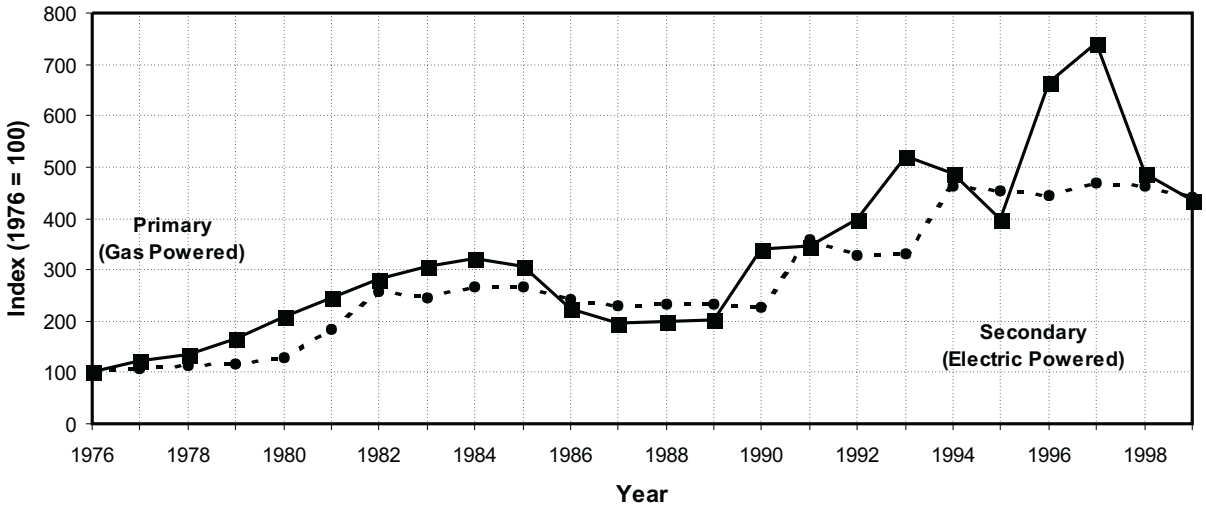
Source: Energy Information Administration, Office of Oil and Gas

Figure 12. Fuel, Power, and Water Cost Indices for 12,000-Foot Oil Wells in California and Rocky Mountains



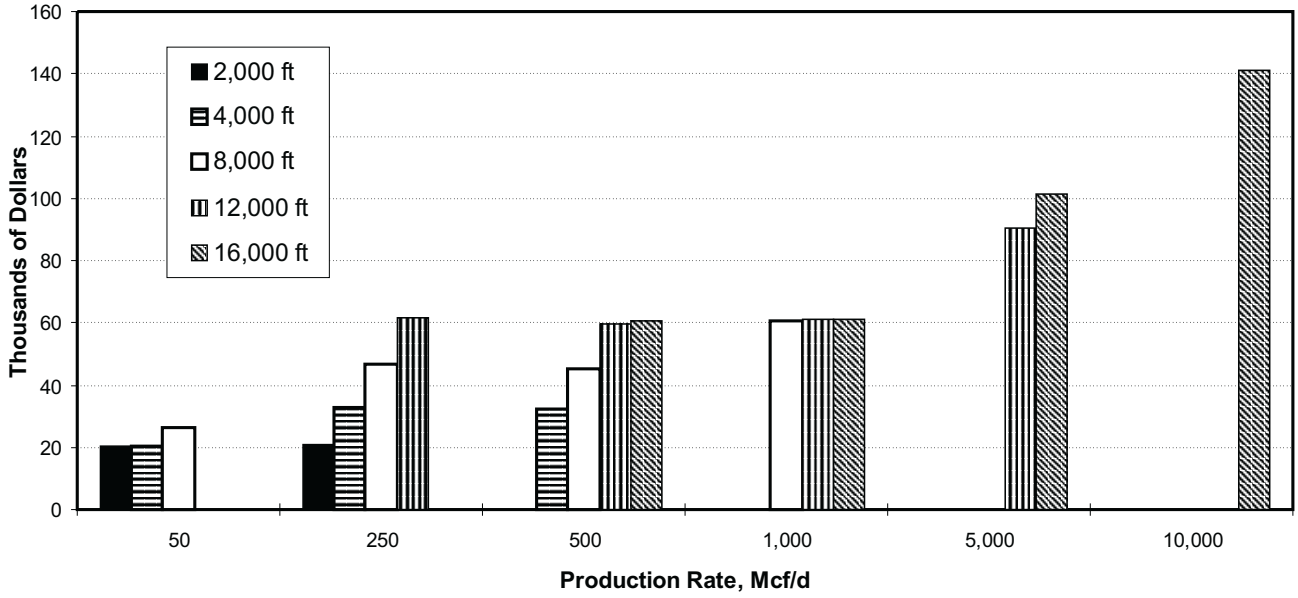
Source: Energy Information Administration, Office of Oil and Gas.

Figure 13. Fuel, Power, and Water Cost Indices for Primary and Secondary Operating Costs for 4,000-Foot Wells in West Texas



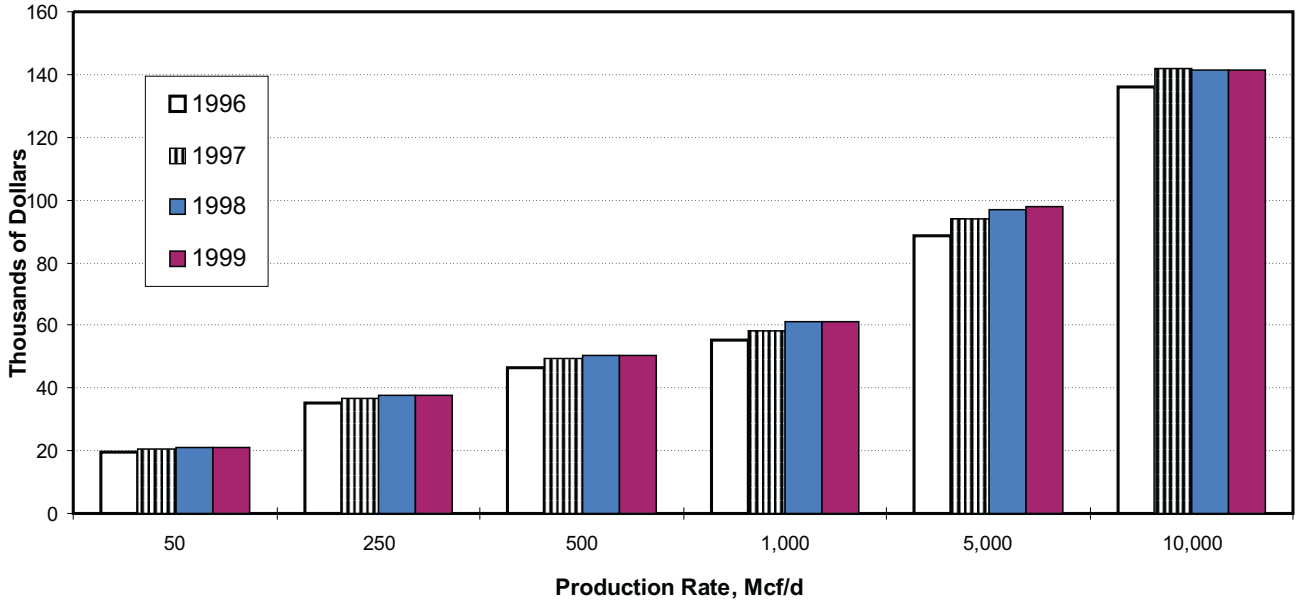
Source: Energy Information Administration, Office of Oil and Gas.

Figure 14. Annual Gas Well Equipment Costs by Well Depth and Production Rate (1999)



Source: Energy Information Administration, Office of Oil and Gas.

Figure 15. Aggregate Average Equipment Costs for a One-well Gas Lease by Production Rate, 1996-1999



Source: Energy Information Administration, Office of Oil and Gas.

Table 6. Average Equipment Costs and Indices for Gas Leases Aggregated for All Depths, Areas and Production Rates (One Producing Well)

	Index (1976=100)				1999* Cost
	1996	1997	1998	1999	(dollars)
Aggregate average for all Production Rates	**192.3**	**202.1**	**208.1**	**208.1**	**48,700**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 7. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 50 Thousand Cubic Feet per Day

	Index (1976=100)				1999* Cost
Area	1996	1997	1998	1999	(dollars)
			2,000-Foot Wells		
Mid-Continent	195.0	204.0	207.9	208.9	21,100
North Louisiana	186.7	196.2	197.1	198.1	20,800
South Louisiana	186.7	196.2	197.1	198.1	20,800
Rocky Mountains	190.2	199.1	202.7	204.5	22,900
South Texas	186.4	194.2	195.1	197.1	20,300
West Texas	169.3	174.3	177.2	176.2	17,800
Average or Index	**184.8**	**193.3**	**195.2**	**196.2**	**20,600**
			4,000-Foot Wells		
Mid-Continent	195.0	204.0	207.9	208.9	21,100
South Louisiana	186.7	196.2	197.1	198.1	20,800
Rocky Mountains	190.2	199.1	202.7	204.5	22,900
South Texas	186.4	194.2	195.1	197.1	20,300
West Texas	169.3	174.3	177.2	176.2	17,800
Average or Index	**186.5**	**194.2**	**197.1**	**198.1**	**20,600**
			8,000-Foot Wells		
West Texas	187.8	194.7	200.0	202.3	26,500
Aggregate Average for Production Rate	**185.0**	**193.5**	**196.3**	**197.2**	**21,100**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 8. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 250 Thousand Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
Mid-Continent	201.9	211.2	214.0	215.9	23,100
North Louisiana	186.7	196.2	197.1	198.1	20,800
South Louisiana	186.7	196.2	197.1	198.1	20,800
Rocky Mountains	190.2	199.1	202.7	204.5	22,900
South Texas	186.4	194.2	195.1	197.1	20,300
West Texas	169.3	174.3	177.2	176.2	17,800
Average or Index	**185.8**	**194.3**	**196.2**	**198.1**	**21,000**
			4,000-Foot Wells		
Mid-Continent	209.0	219.4	223.9	223.9	30,000
North Louisiana	205.0	215.8	218.7	219.4	30,500
South Louisiana	203.6	215.1	218.7	222.3	30,900
Rocky Mountains	185.1	195.3	200.4	196.6	46,200
South Texas	202.9	210.9	214.5	218.8	30,200
West Texas	191.8	198.5	204.5	206.7	27,700
Average or Index	**198.0**	**207.8**	**212.4**	**213.1**	**32,600**
			8,000-Foot Wells		
Mid-Continent	193.0	203.9	207.8	203.9	46,900
North Louisiana	185.3	196.2	198.7	195.0	46,400
South Louisiana	187.4	198.7	201.3	199.6	47,500
Rocky Mountains	155.1	163.2	172.0	168.9	50,000
South Texas	187.7	195.3	197.9	197.0	46,500
West Texas	181.3	188.7	193.9	191.7	44,100
Average or Index	**180.4**	**189.8**	**193.9**	**191.4**	**46,900**
			12,000-Foot Wells		
Mid-Continent	225.8	237.5	243.0	244.5	62,600
Rocky Mountains	184.0	193.6	203.8	202.9	63,300
West Texas	212.5	221.9	228.9	229.7	58,800
Average or Index	**205.5**	**215.6**	**223.6**	**224.0**	**61,600**
Aggregate Average for Production Rate	**191.3**	**200.5**	**205.5**	**204.9**	**37,500**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 9. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 500 Thousand Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			4,000-Foot Wells		
Mid-Continent	205.5	216.5	221.3	220.5	28,000
North Louisiana	188.5	199.0	200.0	200.0	20,800
Rocky Mountains	152.4	160.5	168.9	165.7	47,400
Average or Index	**173.3**	**182.6**	**188.4**	**186.6**	**32,100**
			8,000-Foot Wells		
Mid-Continent	186.8	195.2	198.7	196.5	44,800
North Louisiana	182.1	193.2	195.7	193.6	45,500
South Louisiana	182.1	193.2	195.7	193.6	45,500
Rocky Mountains	153.1	161.1	169.4	166.3	47,900
South Texas	182.4	190.1	192.7	191.4	44,600
West Texas	175.4	182.9	188.2	185.5	42,300
Average or Index	**176.3**	**185.1**	**189.6**	**187.1**	**45,100**
			12,000-Foot Wells		
Mid-Continent	224.9	236.5	242.2	243.4	60,600
North Louisiana	217.2	229.7	234.4	235.2	60,200
South Louisiana	217.2	229.7	234.4	235.2	60,200
Rocky Mountains	182.9	192.4	202.6	201.6	61,300
South Texas	217.7	227.2	231.9	233.5	59,300
West Texas	212.0	221.3	228.5	228.9	57,000
Average or Index	**211.5**	**222.2**	**228.4**	**229.1**	**59,800**
			16,000-Foot Wells		
Mid-Continent	187.6	197.3	207.4	206.4	61,500
South Louisiana	217.2	229.7	234.4	235.2	60,200
West Texas	184.2	193.0	203.0	202.3	60,300
Average or Index	**195.4**	**205.6**	**214.1**	**213.7**	**60,700**
Aggregate Average for Production Rate	**191.4**	**201.6**	**207.4**	**206.6**	**50,400**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 10. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 1 Million Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			8,000-Foot Wells		
South Louisiana	182.9	193.1	202.3	201.3	61,200
South Texas	184.1	192.0	201.3	200.7	60,400
Average or Index	**183.2**	**192.4**	**201.7**	**200.7**	**60,800**
			12,000-Foot Wells		
Mid-Continent	187.6	197.3	207.4	206.4	61,500
North Louisiana	182.9	193.1	202.3	201.3	61,200
South Louisiana	182.9	193.1	202.3	201.3	61,200
Rocky Mountains	182.9	192.4	202.6	201.6	61,300
South Texas	183.4	191.4	200.7	200.0	60,400
West Texas	184.2	193.0	203.0	202.3	60,300
Average or Index	**183.8**	**193.0**	**203.0**	**202.0**	**61,000**
			16,000-Foot Wells		
Mid-Continent	187.6	197.3	207.4	206.4	61,500
North Louisiana	182.9	193.1	202.3	201.3	61,200
South Louisiana	182.9	193.1	202.3	201.3	61,200
West Texas	184.2	193.0	203.0	202.3	60,300
Average or Index	**184.4**	**194.0**	**203.7**	**203.0**	**61,100**
Aggregate Average for Production Rate	**183.8**	**193.4**	**202.6**	**202.0**	**61,000**

* Preliminary
Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.
Source: Energy Information Administration, Office of Oil and Gas

Table 11. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 5 Million Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			12,000-Foot Wells		
South Louisiana	184.8	196.9	202.5	204.3	91,100
South Texas	184.9	195.3	200.9	202.9	90,100
Average or Index	**184.9**	**196.2**	**201.8**	**203.6**	**90,600**
			16,000-Foot Wells		
Mid-Continent	188.6	200.2	206.6	208.2	91,400
North Louisiana	226.2	240.4	248.2	252.2	112,500
South Louisiana	226.2	240.4	248.2	252.2	112,500
West Texas	185.6	196.4	202.5	204.8	89,900
Average or Index	**206.5**	**219.2**	**226.4**	**229.3**	**101,600**
Aggregate Average for Production Rate	**199.5**	**211.7**	**218.5**	**221.0**	**97,900**

* Preliminary
Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.
Source: Energy Information Administration, Office of Oil and Gas

Table 12. Summary of Gas Lease Equipment Costs and Composite Indices for One Well Producing 10 Million Cubic Feet per Day

Area	Index (1976=100)				1999* Cost (dollars)
	1996	1997	1998	1999	
North Louisiana	229.2	239.3	238.3	238.1	141,200

* Preliminary
Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.
Source: Energy Information Administration, Office of Oil and Gas

Table 13. Summary of Aggregate Average Gas Lease Equipment Costs by Well Depth (1996-1999)

Well Depth (feet)	Average Costs (dollars)			
	1996	1997	1998	1999
	19,600	20,500	20,700	20,800
4,000	26,300	27,600	28,200	28,200
8,000	43,700	45,900	47,200	46,700
12,000	58,700	61,800	64,100	64,100
16,000	74,200	78,300	80,800	81,100

* Preliminary

Table 14. Average Operating Costs and Indices for Gas Leases Aggregated for All Depths, Areas and Production Rates (One Producing Well)

Area	Index (1976=100)				1999* Cost (dollars)
	1996	1997	1998	1999	
Aggregate Average for all Production Rates	223.6	238.7	248.1	250.0	26,500

* Preliminary
Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.
Source: Energy Information Administration, Office of Oil and Gas

Table 15. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 50 Thousand Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
Mid-Continent	273.5	300.0	305.9	308.8	10,500
North Louisiana	229.3	251.2	253.7	256.1	10,500
South Louisiana	229.3	251.2	253.7	256.1	10,500
Rocky Mountains	220.8	239.6	262.5	264.6	12,700
South Texas	248.7	251.3	256.4	261.5	10,200
West Texas	247.1	255.9	279.4	285.3	9,700
Average or Index	**237.5**	**252.5**	**265.0**	**267.5**	**10,700**
			4,000-Foot Wells		
Mid-Continent	252.4	276.2	285.7	290.5	12,200
South Louisiana	229.8	251.1	257.4	259.6	12,200
Rocky Mountains	217.9	237.5	260.7	262.5	14,700
South Texas	246.7	253.3	260.0	264.4	11,900
West Texas	251.2	261.0	282.9	287.8	11,800
Average or Index	**239.1**	**256.5**	**269.6**	**273.9**	**12,600**
			8,000-Foot Wells		
West Texas	229.3	239.7	258.6	256.9	14,900
Aggregate Average for Production Rate	**236.4**	**252.3**	**265.9**	**268.2**	**11,800**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 16. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 250 Thousand Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			2,000-Foot Wells		
Mid-Continent	261.7	289.4	295.7	297.9	14,000
North Louisiana	224.5	246.9	251.0	253.1	12,400
South Louisiana	224.5	246.9	251.0	253.1	12,400
Rocky Mountains	217.9	237.5	258.9	260.7	14,600
South Texas	240.4	246.8	253.2	257.4	12,100
West Texas	238.1	250.0	271.4	276.2	11,600
Average or Index	**235.4**	**254.2**	**264.6**	**268.8**	**12,900**
			4,000-Foot Wells		
Mid-Continent	250.0	272.7	281.8	286.4	18,900
North Louisiana	228.4	247.8	255.2	258.2	17,300
South Louisiana	226.9	247.8	255.2	256.7	17,200
Rocky Mountains	218.3	235.5	258.1	259.1	24,100
South Texas	232.3	240.0	247.7	250.8	16,300
West Texas	231.1	242.6	262.3	263.9	16,100
Average or Index	**230.0**	**247.1**	**260.0**	**261.4**	**18,300**
			8,000-Foot Wells		
Mid-Continent	246.2	267.0	276.4	279.2	29,600
North Louisiana	225.4	244.1	253.4	255.1	30,100
South Louisiana	221.2	241.5	250.0	251.7	29,700
Rocky Mountains	218.4	234.4	253.6	255.2	31,900
South Texas	226.1	233.9	240.9	244.3	28,100
West Texas	227.4	237.7	257.5	259.4	27,500
Average or Index	**226.1**	**241.7**	**253.9**	**256.5**	**29,500**
			12,000-Foot Wells		
Mid-Continent	242.1	260.9	271.4	274.4	36,500
Rocky Mountains	222.9	237.9	256.2	256.9	39,300
West Texas	225.2	234.8	254.1	253.3	34,200
Average or Index	**230.0**	**245.0**	**260.7**	**262.1**	**36,700**
Aggregate Average for Production Rate	**228.7**	**244.8**	**257.5**	**259.8**	**22,600**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 17. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 500 Thousand Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			4,000-Foot Wells		
Mid-Continent	265.0	290.0	300.0	303.3	18,200
North Louisiana	221.1	245.1	249.3	250.7	17,800
Rocky Mountains	215.8	232.6	252.6	252.6	24,000
Average or Index	**232.0**	**253.3**	**265.3**	**266.7**	**20,000**
			8,000-Foot Wells		
Mid-Continent	260.2	284.3	291.6	295.2	24,500
North Louisiana	217.3	238.5	243.3	246.2	25,600
South Louisiana	219.2	242.3	247.1	250.0	26,000
Rocky Mountains	220.0	236.2	256.2	258.1	27,100
South Texas	195.5	196.4	199.1	203.6	22,400
West Texas	230.1	236.1	260.2	263.9	21,900
Average or Index	**222.4**	**237.8**	**248.0**	**251.0**	**24,600**
			12,000-Foot Wells		
Mid-Continent	255.3	275.7	284.5	287.4	29,600
North Louisiana	215.3	235.6	241.5	244.9	28,900
South Louisiana	223.7	244.9	250.0	252.5	29,800
Rocky Mountains	222.8	238.6	256.7	259.1	32,900
South Texas	235.1	239.5	244.7	250.0	28,500
West Texas	226.7	231.4	254.3	253.3	26,600
Average or Index	**229.8**	**243.9**	**255.3**	**257.9**	**29,400**
			16,000-Foot Wells		
Mid-Continent	244.9	264.4	272.0	274.6	32,400
South Louisiana	218.2	237.9	243.9	247.0	32,600
West Texas	225.8	233.3	253.3	250.8	30,100
Average or Index	**230.1**	**245.5**	**256.9**	**257.7**	**31,700**
Aggregate Average for Production Rate	**226.9**	**242.3**	**253.8**	**255.8**	**26,600**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 18. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 1 Million Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			8,000-Foot Wells		
South Louisiana	219.8	242.7	246.6	248.1	32,500
South Texas	251.2	255.1	259.8	264.6	33,600
Average or Index	**235.7**	**248.8**	**253.5**	**256.6**	**33,100**
			12,000-Foot Wells		
Mid-Continent	254.9	275.9	284.2	285.7	38,000
North Louisiana	214.4	234.6	239.9	241.2	36,900
South Louisiana	223.5	243.1	249.0	250.3	38,300
Rocky Mountains	226.9	242.9	261.5	262.8	41,000
South Texas	212.8	216.1	218.8	223.5	33,300
West Texas	223.5	229.4	250.0	250.7	34,100
Average or Index	**225.2**	**239.5**	**249.7**	**251.0**	**36,900**
			16,000-Foot Wells		
Mid-Continent	248.0	268.2	276.4	277.7	41,100
North Louisiana	216.3	235.5	240.7	241.9	41,600
South Louisiana	215.7	234.9	240.7	242.4	41,700
West Texas	225.3	232.7	252.7	252.7	37,900
Average or Index	**224.8**	**241.6**	**250.9**	**252.2**	**40,600**
Aggregate Average for Production Rate	**227.7**	**242.6**	**251.4**	**253.4**	**37,500**

* Preliminary

Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.

Source: Energy Information Administration, Office of Oil and Gas

Table 19. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 5 Million Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			12,000-Foot Wells		
South Louisiana	220.8	235.4	238.2	239.6	34,500
South Texas	210.8	217.5	217.5	221.1	36,700
Average or Index	**215.5**	**225.8**	**227.1**	**229.7**	**35,600**
			16,000-Foot Wells		
Mid-Continent	205.1	217.3	220.4	221.9	43,500
North Louisiana	202.9	214.8	217.1	219.0	46,000
South Louisiana	202.9	214.4	216.7	218.7	45,700
West Texas	198.0	205.0	213.0	216.0	43,200
Average or Index	**202.0**	**212.7**	**216.7**	**218.6**	**44,600**
Aggregate Average for Production Rate	**205.3**	**216.0**	**219.1**	**221.3**	**41,600**

* Preliminary
Note: Reported average or aggregate average indices are indices of the average costs. They are not an average of the index values.
Source: Energy Information Administration, Office of Oil and Gas

Table 20. Summary of Gas Lease Operating Costs and Composite Indices for One Well Producing 10 Million Cubic Feet per Day

Area	Index (1976=100) 1996	1997	1998	1999	1999* Cost (dollars)
			16,000-Foot Wells		
North Louisiana	197.9	208.0	208.4	209.1	60,000

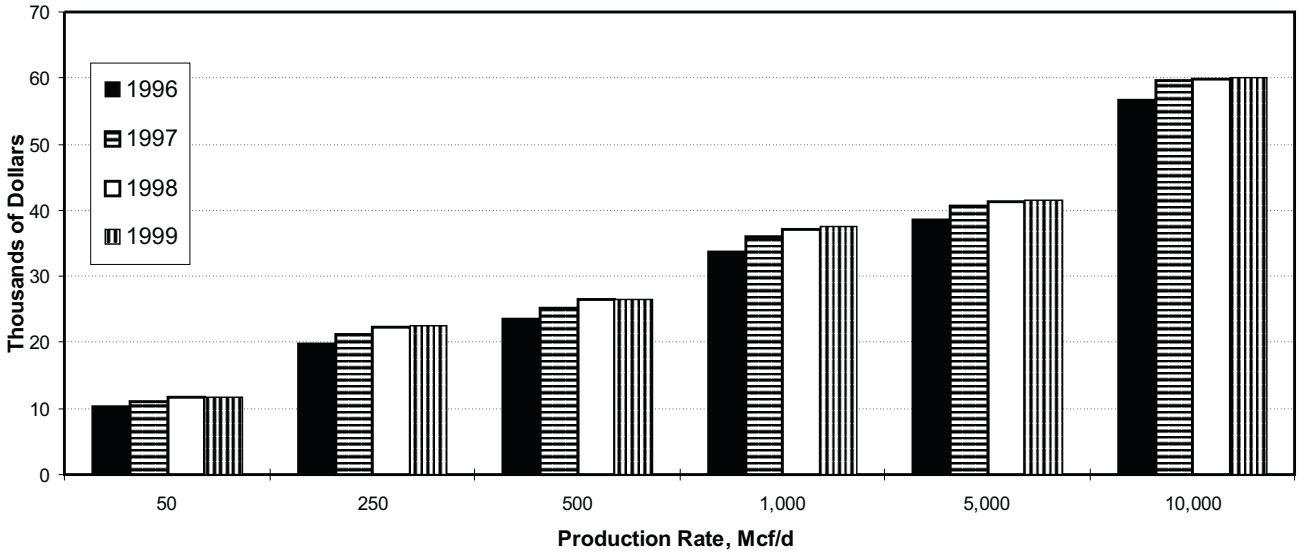
* Preliminary
Note: This is the only area in which a 16,000-foot well producing 10 MMcf per day is reported.
Source: Energy Information Administration, Office of Oil and Gas

Table 21. Summary of Aggregate Average Gas Lease Operating Cost, by Well Depth (1996-99)

Well Depth (feet)	Average Cost, Dollars 1996	1997	1998	1999*
2,000	10,400	11,200	11,600	11,800
4,000	14,500	15,700	16,500	16,600
8,000	24,100	25,600	26,800	27,000
12,000	30,500	32,400	33,800	34,100
16,000	37,600	39,900	41,100	41,300

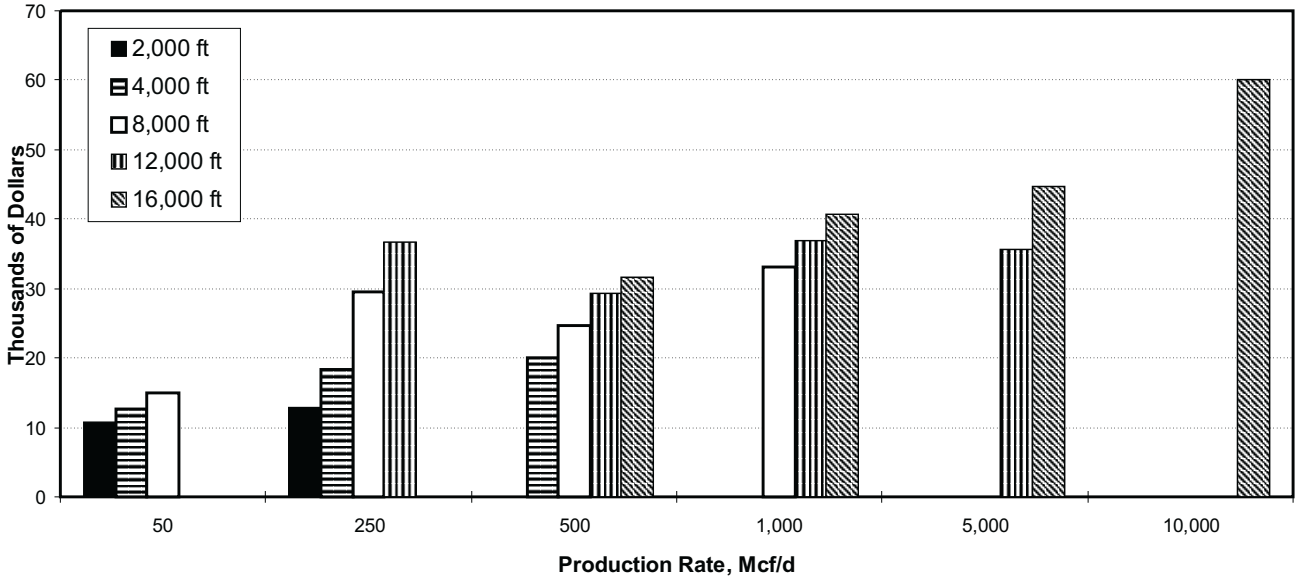
* Preliminary
Source: Energy Information Administration, Office of Oil and Gas

Figure 16. Aggregate Average Annual Gas Well Operating Costs for a One-Well Gas Lease by Production Rate, 1996-1999



Source: Energy Information Administration, Office of Oil and Gas.

Figure 17. Annual Gas Well Operating Costs by Depth and Production Rate, 1999



Source: Energy Information Administration, Office of Oil and Gas.